UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 9
75 Hawthorne Street
San Francisco, CA 94105-3901

MEMORANDUM

DATE: AUG 17 1998

SUBJECT: Five-Year Review for San Fernando Valley Superfund Site Area 4 (North Hollywood Operable Unit)

FROM: Dave Seter, Chief
CA/HI/AZ Section

TO: Keith Takata, Director
Superfund Division

I. INTRODUCTION

Attached is a copy of the five-year review report for the North Hollywood Operable Unit Facility ("NHOU") in the San Fernando Valley Superfund Site, Area 1 ("Site"). This review constitutes the second five-year review of remedial activities conducted at NHOU between 1993 and 1997. The first five-year review report was issued on July 8, 1993, and covered remedial activities from 1989 to 1992.

The purpose of this five-year review is to evaluate whether the North Hollywood Interim Remedy ("Remedy") is achieving the objectives specified in the 1987 Record of Decision ("ROD"). The Remedy selected was a groundwater extraction and treatment system.

II. FIVE YEAR REVIEW SUMMARY

The purpose of the Remedy is to mitigate the observed rapid spread of groundwater contaminants by extraction and hydraulic containment. The contaminated groundwater is treated down to the federal Safe Drinking Water Act, Maximum Contaminant Level and State Action Level for all observed or expected volatile organic substances. The treated waters are then conveyed to the Los Angeles Department of Water and Power's North Hollywood Pumping Station for chlorination and distribution.

Based on data from 1992 to 1997 the Remedy is achieving the objectives. Groundwater modeling simulations based on recently collected hydraulic information indicate that NHOU wells, in conjunction with Los Angeles Department of Water and Power's other eastern North Hollywood wells, are containing the spread of groundwater contaminants.

The NHOU trichloroethylene ("TCE") plume shrank rapidly between 1992 and 1994, corresponding with a downward trend of TCE concentrations from approximately 200 micrograms per liter ("ug/L") in 1992 to below 100 ug/L in 1994. There was no significant change in the perchloroethylene ("PCE") plume during the same period.

III CONCLUSION

After reviewing the attached report EPA finds that the Remedy remains effective at protecting human health and the environment. Since it began operations in 1989 the NHOU groundwater treatment facility has met all requirements stipulated in the Department of Health Services and South Coast Air Quality Management District permits and achieved the treated water quality stated in the ROD.

Five year reviews will continue to be conducted until a final remedy for the Site has been implemented that cleans the Site to health-protective levels that allow for unlimited use and unrestricted exposure. Any questions may be directed to Lance R. Richman, Remedial Project Manager for the Site.

Approved by: Mary Lidy for Date: 8/17/98

Keith Takata, Director
Superfund Division
EPA Region IX

Attachment Five-Year Review Report:
North Hollywood Operable Unit Facility
San Fernando Valley Superfund Site Area 1
Los Angeles County, California
July 1998

FIVE-YEAR REVIEW REPORT
NORTH HOLLYWOOD
OPERABLE UNIT FACILITY

San Fernando Valley Superfund Site—Area 1
Los Angeles County, California

EPA CONTRACT NO. 68-W9-0031
WORK ASSIGNMENT NO. 31-73-9959
CH2M HILL PROJECT NO. 116830.03.00

Prepared for:

U.S. Environmental Protection Agency
Region IX
75 Hawthorne Street
San Francisco, California 94105

Prepared by:

CH2M HILL

July 1998

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Executive Summary

The United States Environmental Protection Agency (EPA) tasked CH2M HILL to conduct a 5-year review of the North Hollywood Operable Unit (NHOU), San Fernando Valley (SFV) Superfund Site, Los Angeles County, California. This statutory 5-year review was conducted pursuant to the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act and the details included in the "Structure and Components of Five-Year Reviews" (OSWER Directive 9355.7-02) and "Supplemental Five-Year Review Guidance" (OSWER Directive 9355.7-02A). This is a Level I 5-year review, which is the most basic of the three levels of 5-year reviews. It includes a document review, a review of the applicable or relevant and appropriate requirements, a site visit, and a conference call with site operation personnel. This level of review was deemed appropriate for the NHOU based on the guidelines provided in the OSWER directives.

This review constitutes the second five-year review of remedial activities conducted at the NHOU between 1993 and 1997. The first five-year review report was issued on July 8, 1993, and covered remedial activities from 1989 to 1992. The purpose of this five-year review is to evaluate whether the North Hollywood Interim Remedy (Remedy) is achieving the objectives specified in the Record of Decision (ROD) (EPA, 1987). The ROD selected a groundwater extraction and treatment system as the Remedy for the NHOU while the SFV remedial investigation is being performed.

Based on data from 1992 to 1997, the NHOU Remedy is achieving its objectives effectively. The NHOU trichloroethylene (TCE) plume shrank rapidly between 1992 and 1994, corresponding with a downward trend of TCE concentrations from below 200 micrograms per liter (µg/L) in 1992 to below 100 µg/L in 1994. The plume appears to have stabilized between 1995 and 1996. In 1996 and 1997, an upward trend in TCE concentrations was observed at one extraction well, suggesting the arrival of a contaminant pulse that may have resulted from ongoing contaminant transport, changes in groundwater flow conditions, or an increase in hydraulic control associated with the recent consistent operation of the NHOU groundwater treatment plant. There was no significant change in the NHOU perchloroethylene plume during this same period. The plume appears to have stabilized between 1993 and 1996.

Groundwater modeling simulations (CH2M HILL, 1996) indicate that the operation of NHOU wells, in conjunction with other Los Angeles Department of Water and Power's (LADWP's) eastern North Hollywood wells, provides control of the NHOU plume area, even at minimum extraction rates. Simulations of past pumping conditions estimate an area of hydraulic control by the end of water year (WY) 1994 of about 220 acres. Simulations of expected future NHOU extraction rates indicate that the NHOU Remedy may achieve hydraulic control over 900 acres during WYs 1995 through 2010, reaching a total of more than 1,100 acres between the beginning of operations in 1989 and WY 2010. This represents an increase of almost five times the controlled plume area and three times the plume mass, compared to the 1994 WY simulation.

Simulations also indicate that without concurrent extractions by LADWP's eastern North Hollywood wells, a narrow, hydraulically uncontrolled path may remain open through the NHOU area between extraction wells NHE-6 and NHE-7. To refine and verify modeling results, CH2M HILL recommends additional model simulations using more accurate water-level data obtained from digital groundwater-level recorders recently installed in most of the Remedial Investigation monitoring wells.

Since it began operation in 1989, the NHOU groundwater treatment facility has met all requirements stipulated in the Department of Health Services and South Coast Air Quality Management District permits and achieved the treated water quality stated in the ROD. The facility was operated intermittently between 1989 and 1995 due to various maintenance and repair activities. Since 1996, the facility's percentage of uptime improved significantly. If the facility's operation becomes intermittent again in the future, an engineering review may be appropriate to evaluate options to achieve and maintain the best achievable uptime, with priority emphasis on repair, preventative maintenance, and improvements.

1.0 Introduction

This statutory 5-year review was conducted pursuant to the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act and the details included in the "Structure and Components of Five-Year Reviews"(OSWER Directive 9355.7-02) and "Supplemental Five-Year Review Guidance" (OSWER Directive 9355.7-02A). This is a Level I 5-year review, which is the most basic of the three levels of 5-year reviews. It includes a document review, a review of the applicable or relevant and appropriate requirements (ARARs), a site visit, and a conference call with site operation personnel.

This review constitutes the second 5-year review of remedial activities conducted at the North Hollywood Operable Unit (NHOU) between 1993 and 1997. The first 5-year review report was issued on July 8, 1993, and covered remedial activities between 1989 and 1992. The purpose of this 5-year review is to evaluate whether the North Hollywood Interim Remedy (Remedy) is achieving the objectives specified in the Record of Decision (ROD) (EPA, 1987).

1.1 NHOU Setting

The San Fernando Valley (SFV) Superfund Site is a large area of groundwater contamination located in Los Angeles County, California (Figure 1-1). The Superfund site was listed on the National Priorities List in 1986 because trichloroethylene (TCE) and perchloroethylene (PCE) were found in groundwater production wells at levels exceeding the Maximum Contaminant Levels (MCLs) for these compounds. As shown in Figure 1-1, the SFV Superfund site is divided into four main areas: North Hollywood, Crystal Springs, Verdugo, and Pollock.

Currently, the NHOU occupies approximately the northern and western portions of the North Hollywood Area (Area 1). The Burbank Operable Unit (OU) occupies the remainder of Area 1. In Area 1, groundwater is being extracted and treated to remove volatile organic compounds (VOCs) at both the North Hollywood and Burbank OUs. The Los Angeles Department of Water and Power (LADWP) operates the NHOU groundwater treatment facility with U.S. Environmental Protection Agency (EPA) funding and oversight. The EPA has recovered over $9 million from nine potentially responsible parties (PRPs), which will support treatment through 2004. The Burbank OU, which has been operating since 1996, is extracting and treating groundwater at a rate of 7,500 gallons per minute (gpm) (EPA, 1997a).

The Glendale North and South OUs constitute the Crystal Spring Area (Area 2), which borders Area 1 to the southeast. In Area 2, two VOC plumes will be treated at a rate of 5,000 gpm, with the treated groundwater to be blended with Municipal Water District water to meet the nitrate standard. This work will continue under a Unilateral Administrative Order or under a Consent Decree the EPA intends to pursue with more than 25 PRPs (EPA, 1997a).

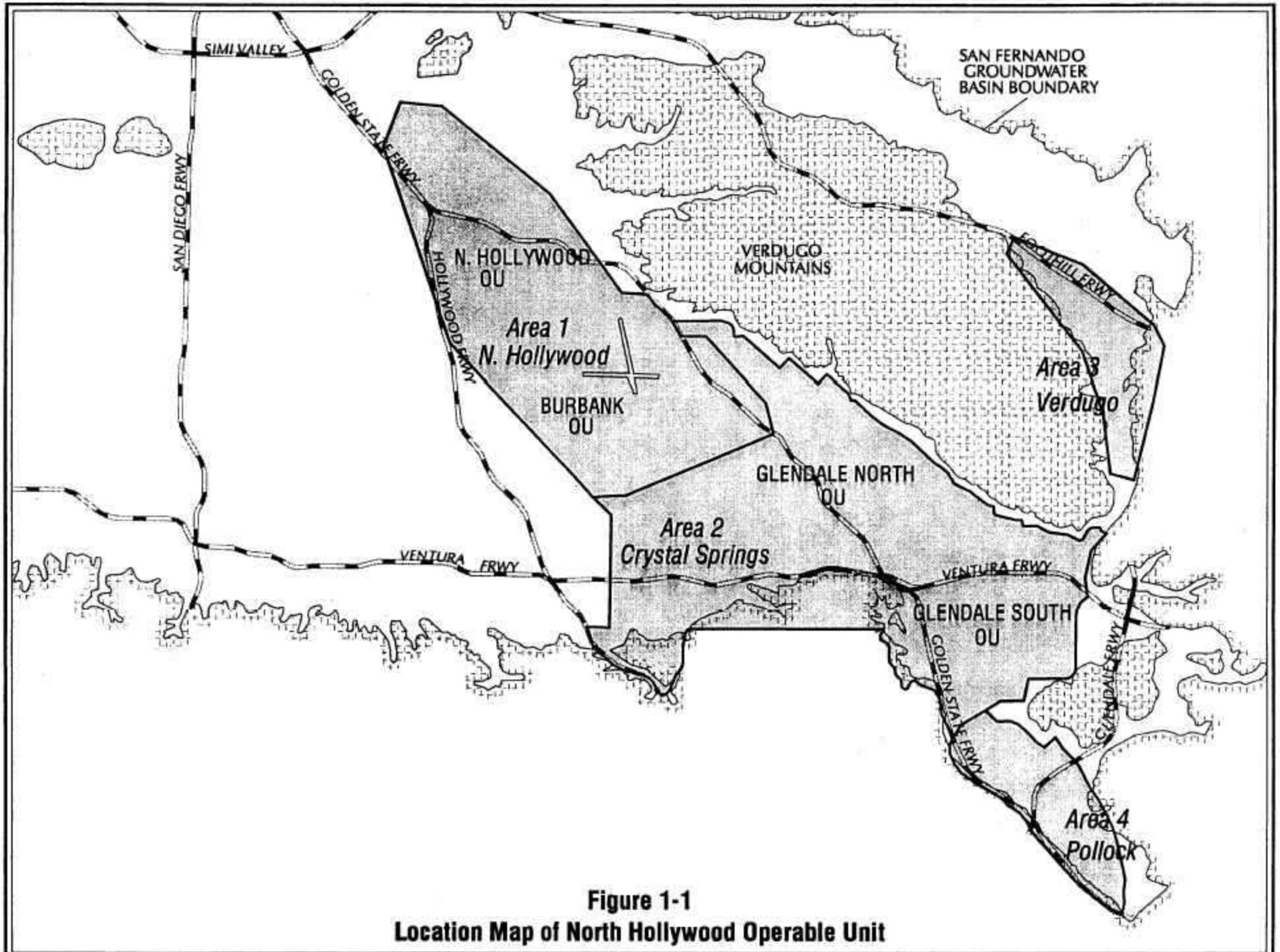


Figure 1-1
Location Map of North Hollywood Operable Unit

/usr/local/projects/sfplume/maps/factsheet/nhou1.aml
July 31, 1998

The Verdugo Area (Area 3) is on the northeastern end of the Verdugo Mountains. In Area 3, EPA is monitoring the groundwater quality in and around several wellfields in the Verdugo Basin, where PCE has been detected above its MCL (EPA, 1997a).

The Pollock Area (Area 4) borders Area 2 to the southeast. In Area 4, EPA has not established an OU because LADWP has under construction a Liquid Phase Granulated Activated Carbon wellhead treatment plant in the Pollock Wellfield. Groundwater will be extracted at 3,000 gpm and treated to drinking water standards; pumping will capture most upgradient contamination. By changing the groundwater elevation through pumping, the Pollock water treatment plant will prevent the groundwater discharge to the Los Angeles River (EPA, 1997a).

1.2 Background

Groundwater contamination was first detected at the SFV Superfund site in 1980, when the California Department of Health Services (DHS) detected TCE, PCE, and other VOCs, such as carbon tetrachloride, 1,1-Dichloroethylene (DCE) and 1,2-DCE, in extracted groundwater in concentrations exceeding MCLs. In 1981, the LAWDP detected relatively widespread groundwater contamination in the eastern portion of the SFV Superfund site. State and local agencies acted to provide alternative water supplies and to investigate and clean up potential sources. The EPA and other agencies became involved in coordinating efforts to address this large-scale contamination issue.

The NHOU includes a network of extraction and Remedial Investigation (RI) monitoring wells as well as production wells in several well fields that have been major producers of potable water in the SFV. The first production wells in the North Hollywood well fields were constructed in 1924, and the most recent wells were completed in 1984. From 1969 to the mid 1980s, the North Hollywood well fields have produced an average of 40 percent, and up to as much as 75 percent, of LADWP's total groundwater production in the SFV. By August 1985, water samples collected from 27 of LADWP's 38 most active wells at that time in the North Hollywood well fields had detectable TCE levels that exceeded MCL. LADWP subsequently shut down several contaminated wells located in the eastern portion of the well fields (LADWP, 1991). As a result, production from the more contaminated eastern portion of the well fields had declined to less than 10 percent of LADWP's groundwater production in the SFV by the late 1980s.

In September 1987, EPA signed the ROD for the NHOU that selected a groundwater extraction and treatment system as the Remedy for the NHOU. As stated in the ROD, the objective of the Remedy is to slow down or arrest the migration of the contamination plume at the North Hollywood-Burbank Well Field as an interim measure while the San Fernando Valley Remedial Investigation (SFVRI) is being performed (EPA, 1987).

Under a cooperative agreement with EPA, the LADWP and DHS designed and constructed the NHOU Remedy. The Remedy consists of eight extraction wells, several RI wells, and a groundwater treatment facility located near the LADWP's North Hollywood Pump Station. The facility was completed in March 1989 and began regular operation in December 1989. Operations at the facility have been ongoing since 1989.

1.3 Report Organization

This report consists of five sections. Following this introduction (Section 1), Section 2 discusses the purpose of this review and summarizes the remedial objectives as presented in the ROD. Section 3 describes the performance of the Remedy in terms of groundwater extraction rates, hydraulic containment, and groundwater quality. Included in this section are data available prior to 1993 and a discussion of metals monitored at the NHOU wells that were not addressed in the initial five-year review. Section 4 describes the performance of the groundwater treatment facility to date and summarizes observations from a recent visit to the facility. Section 5 provides conclusions and recommendations for future actions.

2.0 Remedial Objectives and ARARs Review

On September 23, 1987, EPA signed the ROD for the NHOU. The stated remedial objective was "to mitigate the observed rapid spread of groundwater contaminants in Area 1 by extraction and hydraulic containment while the SFVRI is being performed." Various remedial alternatives for achieving this objective were evaluated. As a result of the evaluation, the ROD states that "a groundwater collection and conveyance system of shallow groundwater extraction wells and collector pipeline, aeration tower, and granulated activated carbon air filtering units, is the most cost-effective remedial alternative for the site that adequately protects human health and the environment." The selected Remedy was a groundwater extraction and treatment system designed to hydraulically contain and treat contaminated groundwater to reduce TCE and PCE levels to 5 micrograms per liter (μg/L) and 4 μg/L, respectively. The treated and chlorinated groundwater was to be conveyed by gravity via an existing pipeline to the LADWP's North Hollywood Pumping Station for distribution.

The federal and state ARARs listed for the Remedy in the ROD include the following:

- **Safe Drinking Water Act** – Requires that treated water from the Remedy meet the MCL for TCE (5 μg/L) and State Action Levels for both TCE (5 μg/L) and PCE (4 μg/L) .

- **Resource Conservation and Recovery Act** – Requires that spent hazardous carbon generated from the treatment process, if any, be disposed of at a RCRA Class I disposal facility.

- **Clean Air Act** – Requires the groundwater treatment facility to meet all substantive conditions stipulated in the South Coast Air Quality Management District's (SCAQMD) permit.

A review of these ARARs indicates that, to date, they remain applicable, relevant, and appropriate for the treatment of groundwater at the NHOU.

Although the ROD does not specifically identify chlorination of the treated groundwater as an element of the selected Remedy, it is a critical process in the discharge of the treated groundwater. Therefore, a review of potential ARARs associated with the chlorination of treated groundwater was performed. The review resulted in two ARARs:

- California Risk Management and Prevention Program (RMPP) (California Health and Safety Code, Diversion 20, Chapter 6.95, Article 2) – Requires compliance with an RMPP plan designed to ensure the safe handling of chlorine at the groundwater treatment facility.

- California Hazardous Materials Release Response Plans and Inventory (California Health and Safety Code Sections 25500 – 25520) – The substantive requirements of this regulation call for reporting releases of hazardous materials to the local fire or environmental health department and providing training to employees regarding emergency responses involving hazardous materials.

3.0 Performance of Remedy

The NHOU Remedy consists primarily of a groundwater extraction and treatment system. Key elements include extraction wells, monitoring wells, and a groundwater treatment facility. Figure 3-1 presents the locations of the NHOU extraction wells, RI and facility monitoring wells, production wells, and the groundwater treatment facility. The eight extraction wells (NHE-1 through NHE-8) are located along an existing LADWP power line right-of-way. NHE-1 was not placed into operation because it dewatered at very low rates of extraction. The RI, facility, and various North Hollywood production wells form a network of monitoring wells that is sampled on a periodic basis to assess the performance of the Remedy. The monitoring network currently includes a total of 24 wells; nine of these wells are sampled quarterly and the remaining 15 wells are sampled on an annual basis.

3.1 North Hollywood Area Hydrogeology

Sediment in the SFV Superfund site is composed of alluvial fill with a maximum depth of more than 1,200 feet. This alluvial fill is subdivided into major “depth regions” consisting of discontinuous fine- and coarse-grained zones. Below the water table, the following four depth regions exist:

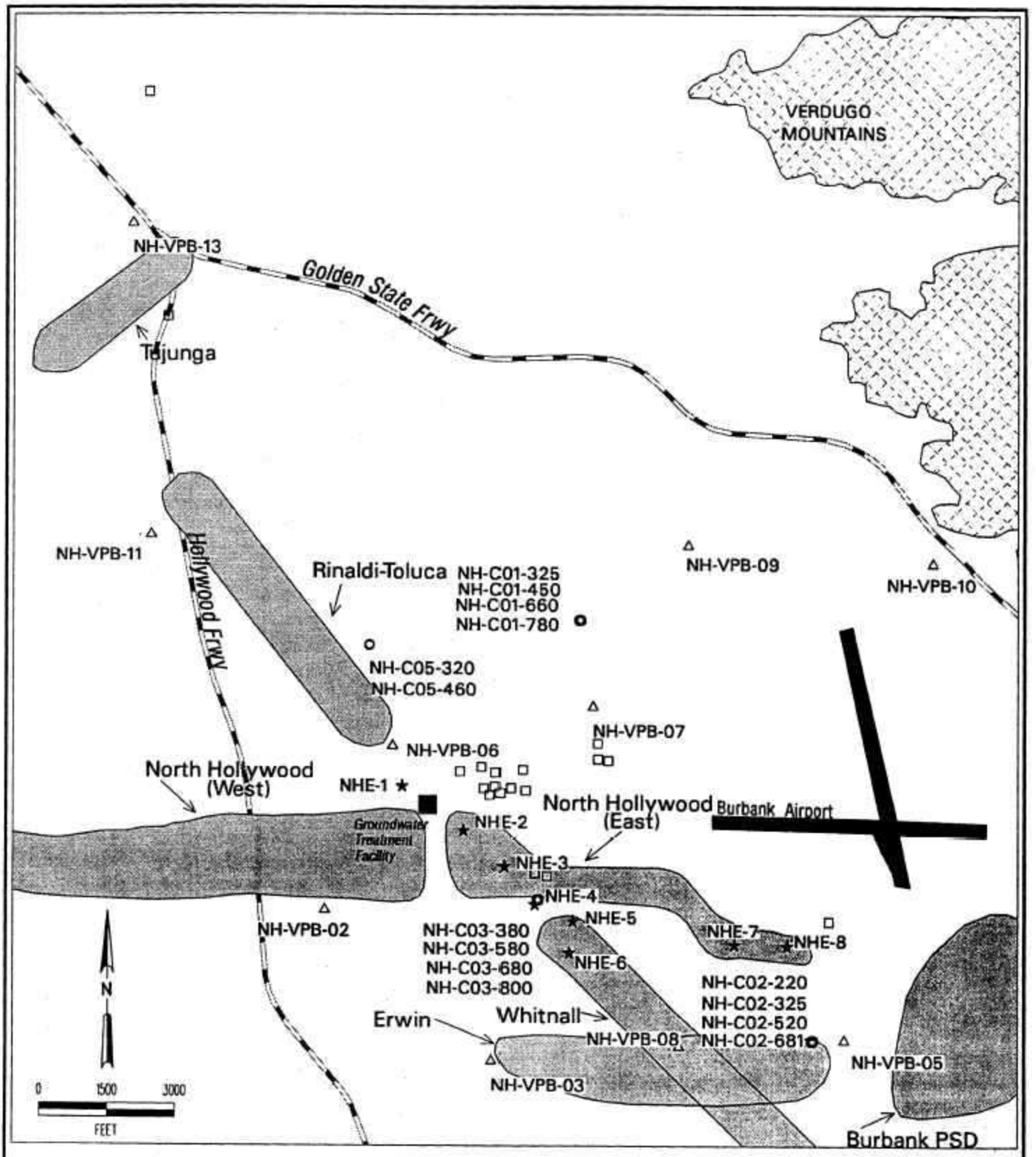
- Region 1 extends from approximately 200 to 280 feet below ground surface (bgs). The older production wells and the shallow RI and facility monitoring wells are screened in this depth region.

- Region 2 extends from approximately 270 to 420 feet bgs. Most production wells in the various North Hollywood well fields are screened in this depth region.

- Region 3 extends from approximately 400 to 700 feet bgs. The newer production wells, such as the Rinaldi-Toluca, Tujunga, and western North Hollywood well fields, are screened in this depth region.

- Region 4 extends below 660 feet bgs. Very few wells are screened in this depth region.

The regional direction of groundwater flow in the SFV Superfund site is generally to the southeast, toward the Los Angeles River Narrows. Groundwater levels in the North Hollywood area respond to seasonal and long-term influences, specifically the pumping activities of nearby wells. Since the discovery of the presence of TCE and PCE in the groundwater in 1985, the pattern of groundwater production from the North Hollywood production well fields has changed substantially. LADWP has decreased production activities from its southeastern and east-central well fields (i.e., North Hollywood East, Whitnall, and Erwin) and increased production activities from its relatively uncontaminated western and northern well fields (i.e., North Hollywood West, Rinaldi-Toluca, and Tujunga). Water production figures provided by the Upper Los Angeles River Area Watermaster showed an average volume from the North Hollywood well fields of about 30,000 acre-feet per year (ac-ft/yr) for the water years (WYs) 1969 to 1989. In peak years (WY 1987), the production



FEATURES:

- SFVRI Cluster Well
- SFVRI Vertical Profile Boring
- NHOU Extraction Well
- Facility Monitoring Well
- Production Well Field

Figure 3-1
Location Map of NHOU Extraction, RI Monitoring Wells, Facility Monitoring Wells, Production Well Fields, and Groundwater Treatment Facility

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volume was reported to be as much as 68,000 ac-ft/yr (Watermaster, 1997). Since WY 1990, an average of 12,000 ac-ft/yr has been produced from the North Hollywood well fields.

3.2 Hydraulic Containment

To achieve the ROD objective of hydraulic containment, the NHOU groundwater extraction wells (NHE-2 through NHE-8) were designed to extract groundwater at a rate of about 300 gpm each. Operating 24 hours per day, 7 days per week, the total effective yield of the NHOU extraction wells was expected to be about 3,000 ac-ft/yr or 1,860 gpm (i.e., seven wells extracting 300 gpm 90 percent of the time). However, sustainable production was about 1,650 gpm initially, and the annual yield has averaged less than 1,000 ac-ft/yr.

The sustained operation of extraction wells NHE-2 and NHE-5 is the most sensitive to low water levels. Thus, to minimize excessive drawdown, their pump capacities are set at a rate lower than designed. Low static water levels appear to be the primary cause of lower-than-expected well yields. Groundwater levels were roughly 40 feet higher in 1987, when the design of the NHOU began, compared to late 1989, when the NHOU began regular operation. Increased use of the western North Hollywood well field and use of the new Rinaldi-Toluca well field were important factors contributing to declining water levels in the North Hollywood area.

In 1996, CH2M HILL was contracted by EPA to conduct a groundwater modeling and particle-tracking effort to assess the hydraulic containment of contaminant plumes (CH2M HILL, 1992a and 1996). A simulation of past extraction conditions that incorporates the actual pumping history of the NHOU estimates an area of hydraulic control of about 220 acres by the end of WY 1994. Simulations for this same period that assume continuous NHOU operation at design capacities suggest that hydraulic control could have been about double in terms of both area and contaminant mass.

Simulations of expected future NHOU extractions indicate that the Remedy may achieve hydraulic control over almost 900 acres of contaminant plume during WYs 1995 through 2010, for a total of more than 1,100 acres for 1989 through 2010. Compared to simulation control of the NHOU achieved by 1994, this represents an increase of almost five times the controlled plume area, representing about three times more plume mass.

A simulation with minimum rates of future NHOU extraction indicates that the NHOU wells, in conjunction with LADWP's eastern North Hollywood wells, control almost the entire NHOU plume area. Groundwater modeling indicates that without concurrent extractions by the nearby wells, a narrow, hydraulically uncontrolled path may remain open through the NHOU between NHE-6 and NHE-7. In 1997, LADWP installed digital groundwater-level recorders in the majority of the RI monitoring wells. This continuous source of water level data in the vicinity of the NHOU extraction wells can be used to refine groundwater simulations to confirm estimates of the hydraulic control achieved by the NHOU Remedy.

3.3 NHOU Groundwater Quality

The frequency of sampling the monitoring wells in the NHOU is based on established criteria outlined in the quarterly groundwater sampling reports (CH2M HILL, 1993, 1994).

The groundwater is currently analyzed for VOCs on a quarterly basis, and for metals and general water chemistry parameters on an annual basis. The metals of interest are:

- Aluminum
- Antimony
- Arsenic
- Barium
- Beryllium
- Cadmium
- Calcium
- Chromium
- Cobalt
- Copper
- Iron
- Lead
- Magnesium
- Manganese
- Mercury
- Nickel
- Potassium
- Selenium
- Silver
- Sodium
- Thallium
- Vanadium
- Zinc

All field sampling activities follow the Sampling and Analysis Plan and Quality Assurance Project Plan (QAPP) (EPA, 1995a and 1995b). The quality assurance data obtained during the sampling events indicate that the quality objectives specified in the QAPP have been met (CH2M HILL, 1997).

The monitoring data are stored in the SFV Geographic Information System (GIS) database (EPA, 1997b). The GIS database also includes groundwater data from the California Regional Water Quality Control Board, California Department of Toxic Substances Control, Lockheed Aeronautical Systems Corporation, and local groundwater purveyors (LADWP, the cities of Glendale and Burbank, and Crescenta Valley County Water District).

The GIS data have been used to create TCE and PCE plume maps for evaluating the effectiveness of the Remedy. Since the GIS data are obtained from various sources on varying sampling schedules, the resulting plume maps do not represent a “snapshot” in time, but rather a compilation of the most recently available data observed at each location over a period of time. Figures 3-2 through 3-7 present the TCE and PCE plume maps in the shallow zone (200 to 280 feet bgs) from 1992 to 1997, respectively. Note that, by convention, contaminant concentrations detected below MCLs are also shown in these maps.

TCE Plume

Prior to 1992, high TCE concentrations (as high as 500 µg/L) were observed primarily in the vicinity of extraction well NHE-2 and, to a lesser extent, near NHE-4. However, from 1992 to 1994 (Figures 3-2 through 3-4), the aerial extent of groundwater impacted with high TCE concentrations (between 100 µg/L and 500 µg/L) shrank rapidly. This corresponds with a trend of decreasing TCE concentrations from below 200 µg/L in 1992 to 150 µg/L in 1993 to 100 µg/L in 1994. The NHOU Remedy appears to be partially responsible for this overall decline in TCE plume and concentrations since its operation began in late 1989.

However, from 1995 (Figure 3-5) to 1997 (Figure 3-7), a trend of increasing TCE concentrations was observed at extraction well NHE-2. TCE levels in NHE-2 increased to about 250 µg/L in 1995 and to over 500 µg/L in 1997. This increase suggests the arrival of a contaminant pulse that may have resulted from ongoing contaminant transport, changes in groundwater flow conditions, changes in contaminant source conditions, or an increase in hydraulic control associated with the recent consistent operation of the NHOU groundwater facility. However, the TCE plume appears to have stabilized from 1995 to 1996.

PCE Plume

Between 1992 and 1997 (Figures 3-2 through 3-7), high PCE concentrations (up to 76 µg/L in 1995) were observed primarily at extraction well NHE-8. This is consistent with the well position at the western edge of groundwater contamination associated with the nearby Burbank OU. PCE concentrations have been mostly below 50 µg/L at the remaining wells (NHE-2 through NHE-7) for the same time period. There has been no significant change in PCE concentrations at the extraction wells to date. The PCE plume appears to have stabilized between 1993 and 1996.

Metals

A review of metals in groundwater obtained between 1992 and 1997 does not indicate a trend in the detection of metals in the NHOU monitoring network. Out of the 23 metals analyzed, iron, antimony, and thallium were the only metals that were intermittently detected above their respective MCLs. In 1992, five of the 23 monitoring wells indicated concentrations of iron above the MCL of 0.3 milligrams per liter (mg/L). The high iron concentration detected is likely to have been caused by corrosion observed on the piping of downhole dedicated pumps during the 1992 sampling event (CH2M HILL, 1992b).

Between 1993 and 1994, groundwater quality from several monitoring wells exceeds MCLs for antimony (0.006 mg/L) and thallium (0.002 mg/L). However, this was a result of higher method detection limits for antimony (0.018 mg/L) and thallium (0.004 mg/L) rather than actual groundwater quality. Also, during these sampling events, antimony and thallium were detected in equipment blank samples and therefore, may not represent the actual groundwater quality (CH2M HILL, 1993 and 1994).

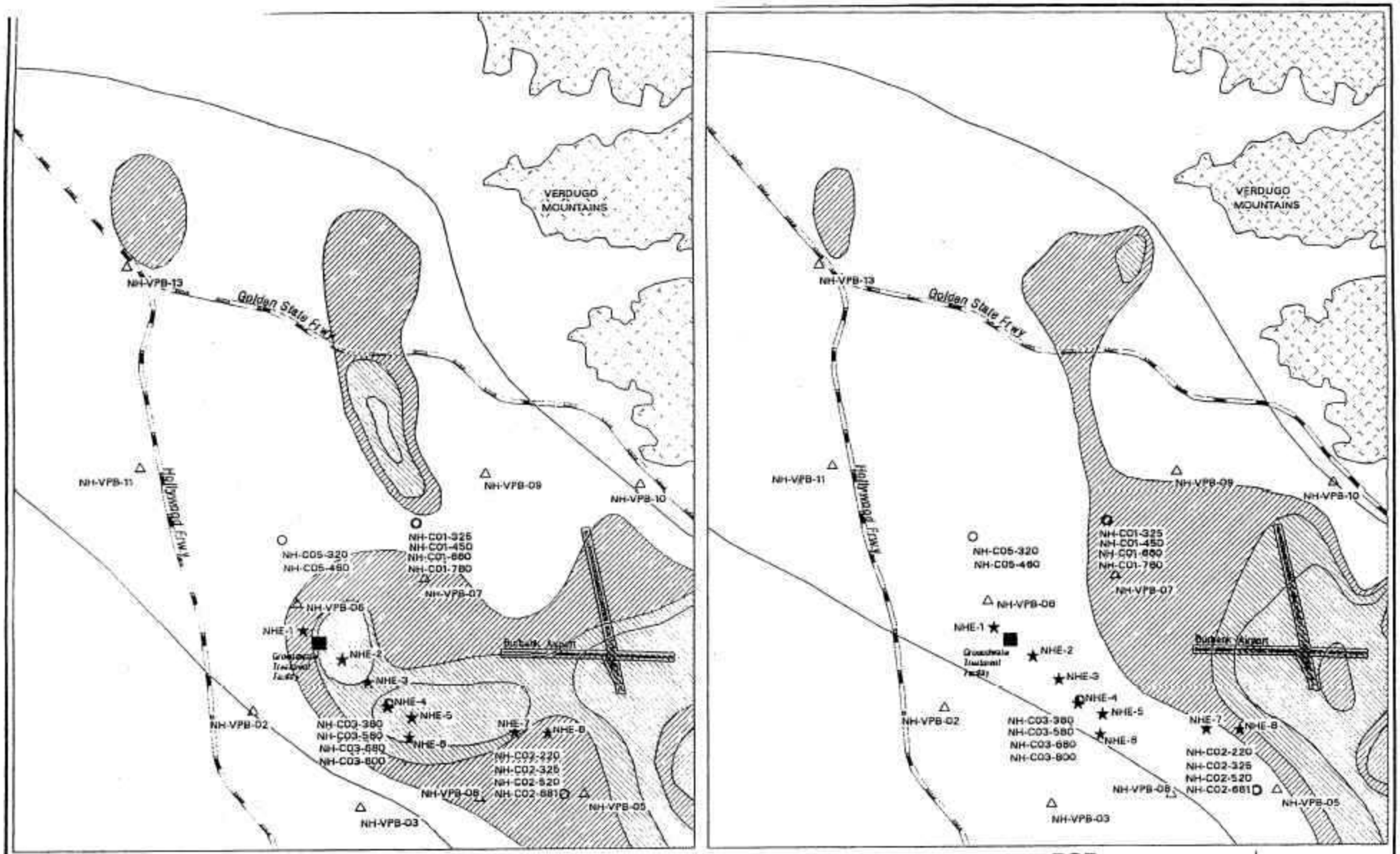

Figure 3-2

TCE AND PCE Contamination (µg/L) in Shallow Zone in Fall 1992

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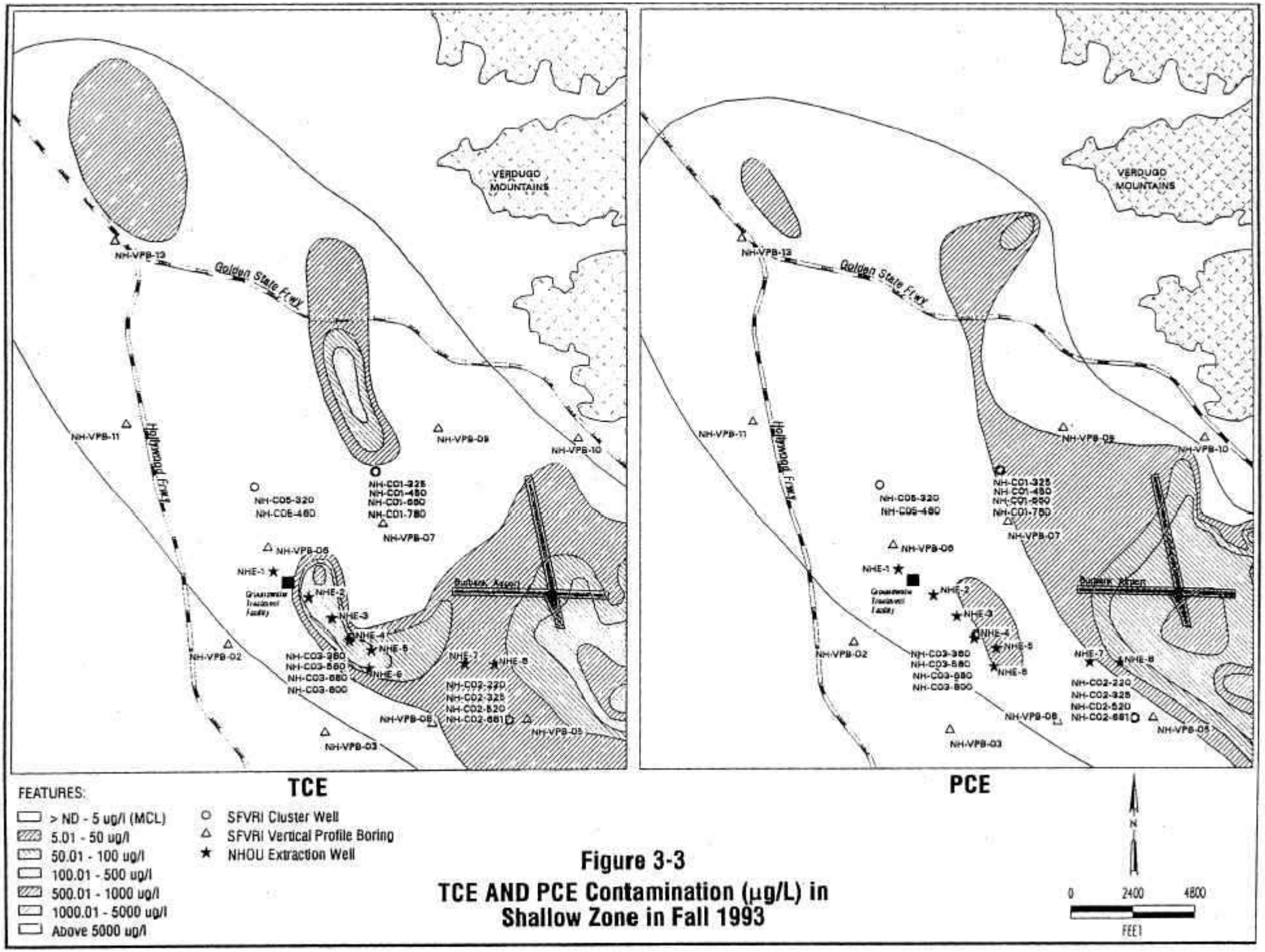

Figure 3-3

TCE AND PCE Contamination (µg/L) in Shallow Zone in Fall 1993

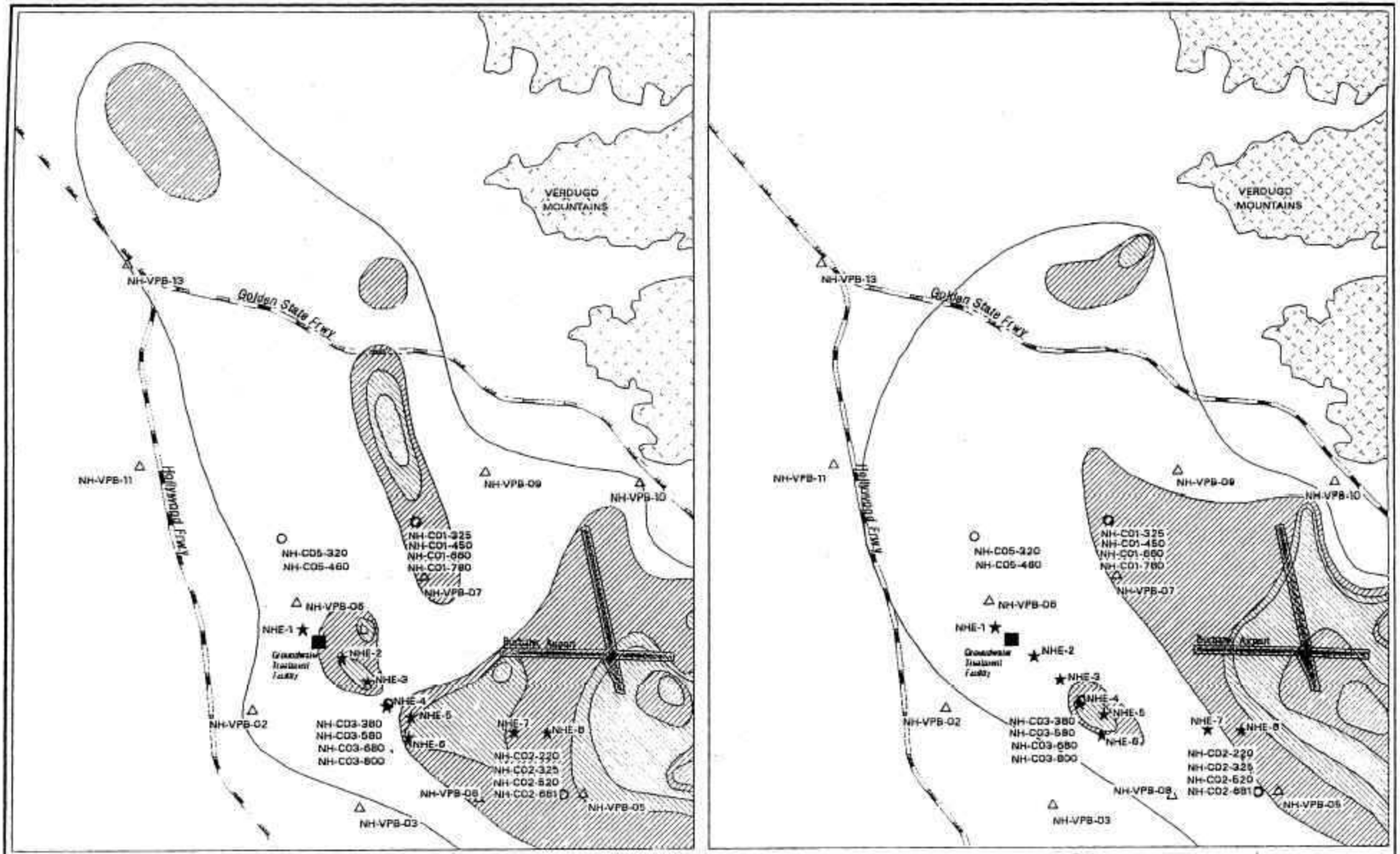

Figure 3-4

TCE AND PCE Contamination (µg/L) in Shallow Zone in Fall 1994

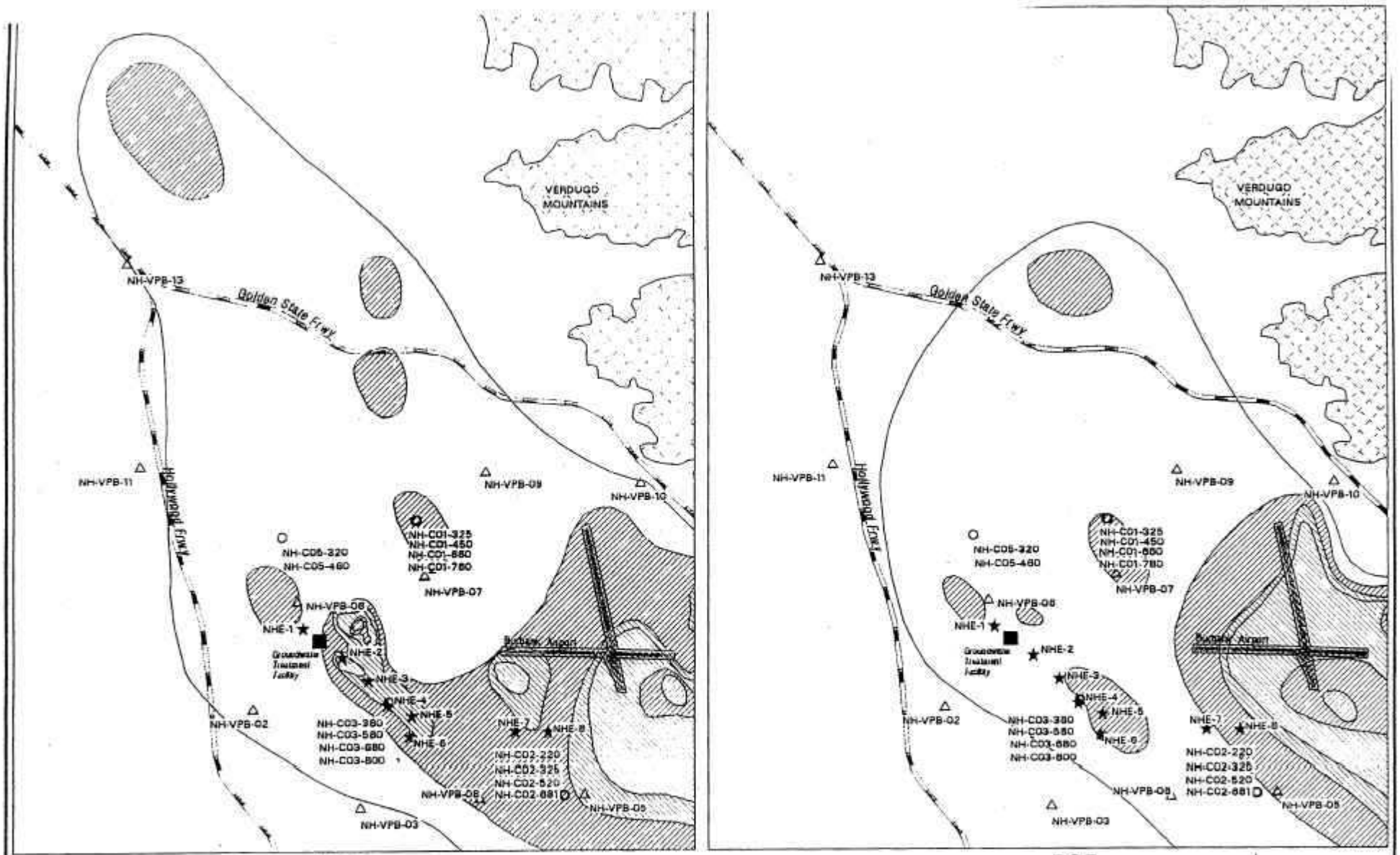

Figure 3-5

TCE AND PCE Contamination (µg/L) in Shallow Zone in Fall 1995

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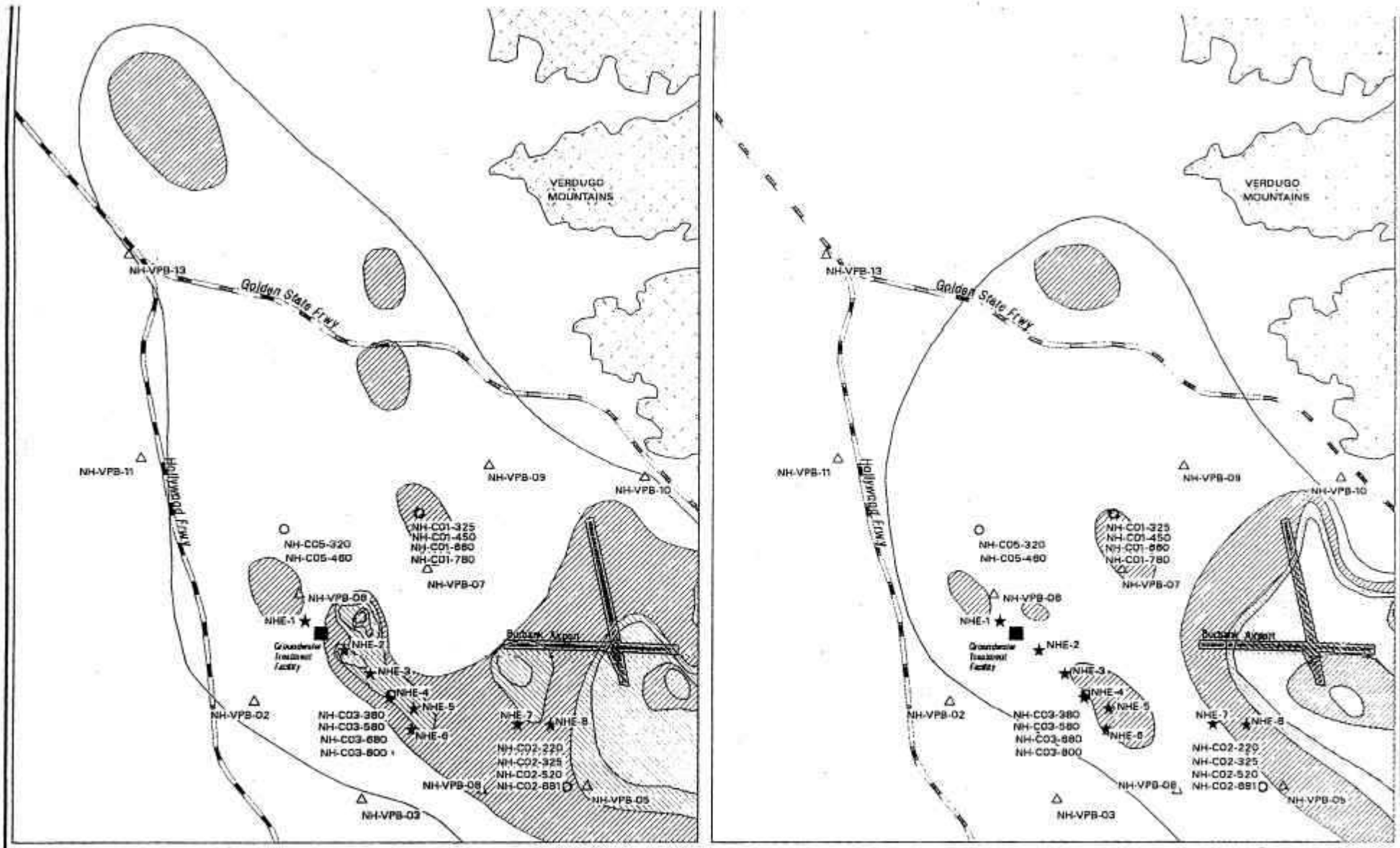

Figure 3-6

TCE AND PCE Contamination (µg/L) in Shallow Zone in 1996

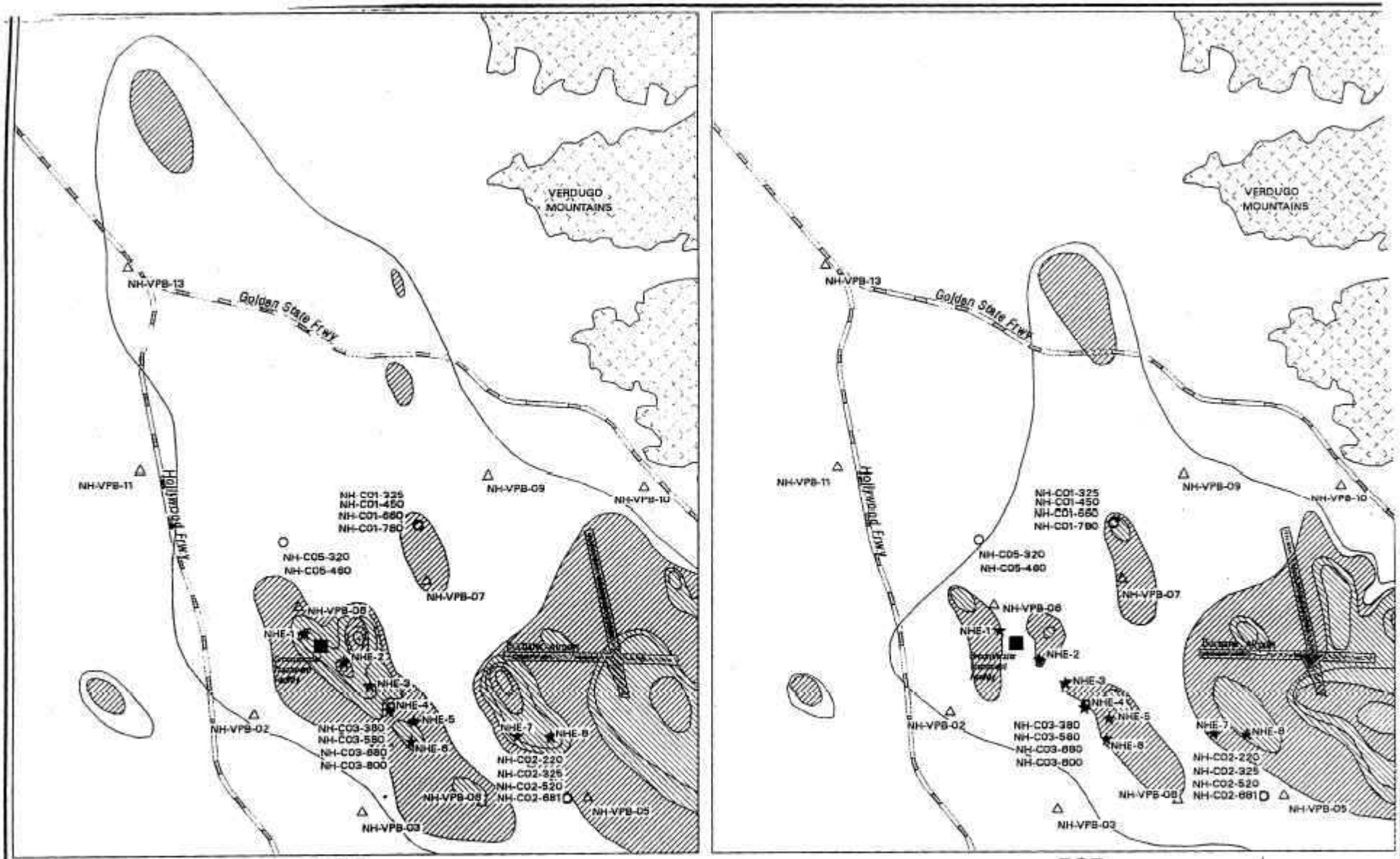

Figure 3-7

TCE AND PCE Contamination (µg/L) in Shallow Zone in 1997

4.0 NHOU Groundwater Treatment Facility

The NHOU groundwater treatment facility is located in an LADWP storage yard at 11845 Vose Street, North Hollywood. The facility began full-time operation in December 1989. The seven wells that supply it are located along an existing electric transmission line right-of-way and on LADWP property along Kittridge Avenue. Contaminated groundwater extracted from the ground flows into a network of 11,000 feet of collector lines and is transported to the groundwater treatment facility. The facility is designed to handle 2,000 gpm of groundwater delivered to an aeration tower.

Figure 4-1 shows a schematic diagram of the treatment facility. As shown in Figure 4-1, contaminated groundwater is transported to the top of a 45-foot-high aeration tower. Prior to entering the tower, the water is injected with a softener (approximately 1 mg/L of sodium hexametaphosphate) to minimize scaling on the tower packing. As the water falls through the tower, an upward air stream blows through the water. The tower is filled with 19.5 feet of packing material that breaks up the water flow and causes good mixing of the air and water. VOCs in the water then vaporize and join the air stream. The air stream then passes through granulated activated carbon (GAC) filters where TCE, PCE, and other VOCs are adsorbed on the GAC bed before the air is released to the atmosphere. The treated water is then disinfected with chlorine and transported offsite via pipeline to a blending facility, where it is blended with water from the Los Angeles Aqueduct Filtration Plant before to entering the water distribution system.

The GAC filters effluent air emissions are being regularly monitored for VOC levels. Once the VOC emissions at the effluent sample port reach the limits specified by the SCAQMD, the facility is shut down and GAC in the filters are replaced. Since 1992, GAC filters have been replaced in October 1992, September 1994, December 1996, and March 1998. The replacement GAC filters contained 14,000 pounds of carbon provided in two GAC filters. The spent GAC is tested for Toxicity Characteristic Leaching Procedure (TCLP) and if it is non-hazardous, the carbon is regenerated by the GAC contractor at an offsite facility or is appropriately disposed of. In 1996 and 1998, spent GAC was characterized as non-hazardous based on the TCLP test for volatile organics and therefore, were sent offsite for regeneration and reuse by other facilities.

To ensure proper operation, the treatment facility is designed with alarms and safety shut-down devices that will safely shut down the system in the event of mechanical failure or process irregularities and remotely alert the LADWP operator of the shut down. In October 1995, an RMPP report was prepared to address chlorine-handling activities at the NHOU groundwater treatment facility. The RMPP plan was prepared in compliance with the State of California Health and Safety Code, Division 20, Chapter 6.95, Article 2, Hazardous Materials Management. The Los Angeles City Fire Department is the local administering agency responsible for implementing the RMPP requirements.

LADWP operates the NHOU groundwater treatment facility under two operating permits issued by the DHS and the SCAQMD. The DHS permit is an amendment to the LADWP Total Water System Permit dated October 15, 1986, for the North Hollywood Wells and

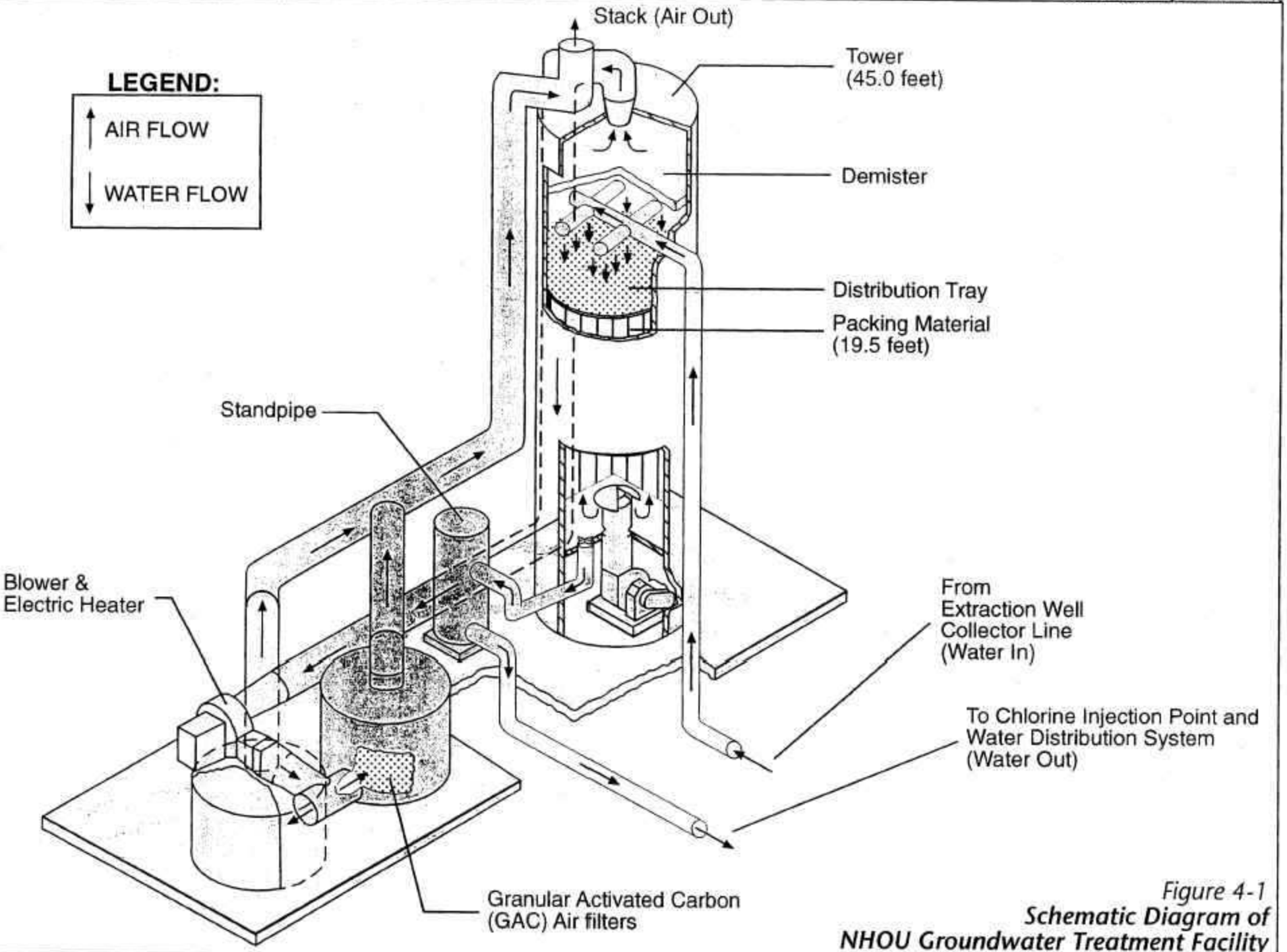

Figure 4-1
Schematic Diagram of NHOU Groundwater Treatment Facility

Aeration Facility. This permit requires that the treated water supplied for domestic purposes from the North Hollywood sump shall not exceed the state MCLs and Alternate Concentration Limits (ACLs), and be properly disinfected with chlorine before leaving the facility. In order for the LADWP to maintain the quality of its water supply, the operational limits are set at 60 percent of the MCLs for TCE and PCE. The treated water is sampled and tested monthly for VOCs, total coliform, and phosphorous.

The SCAQMD permit was issued on August 29, 1986, to ensure proper operation of the air emission control system (i.e., the GAC filters). This permit stipulates maximum allowable daily emissions for ten compounds, including TCE and PCE, and the maximum daily for total VOCs emissions at 2 pounds. In addition, the permit specifies an air monitoring program to ensure that the emission limits are not exceeded. SCAQMD staff also inspect the facility once every other year.

4.1 Operation Status

Since it began operation in 1989, the NHOU groundwater treatment facility has met all requirements stipulated in the DHS and SCAQMD permits and achieved the treated water quality stated in the ROD. Before 1995, the treatment plant was operated intermittently because of maintenance and repairs to the extraction well pumps and various mechanical components in the treatment system, as well as the collector pipeline and mechanical components at other water supply locations. In 1996, the plant was operated continuously except for the months of January, February, and April, due to mechanical and electrical problems. In 1997, except for April and May, the plant was online continuously. In January and February 1998, the facility was operated continuously. The facility was not online for about half of the month of March (the most current data available) because of the change-out of carbon filters and the repair of a mechanical component.

Up to December 1997, the treatment facility processed an approximate total of 7,500 ac-ft of contaminated groundwater that had been extracted from seven wells. Through the years, the water flow rate to the aeration tower has ranged from 700 gpm to 1,700 gpm and has averaged 1,300 gpm. Based on data from 1992 to 1997, the average concentration for TCE and PCE in the influent water to the aeration tower was approximately 80 and 13 μg/L, respectively. The corresponding averages of TCE and PCE concentrations in treated water were approximately 1.4 and non-detect (assume zero) μg/L, respectively. Prior to 1992, these concentrations were measured to be much higher (during 1989 and 1991). Assuming that the facility has continuously operated at the average flowrate and concentration since 1989, the total mass of VOCs (TCE, PCE, carbon tetrachloride, 1,1-DCE, and 1,2-DCE and other VOCs) removed, is estimated to be about 2,800 pounds (an order-of-magnitude estimate).

4.2 Site Visit

On April 13, 1998, Lance Richman of U.S. EPA Region IX and Christina Hong of CH2M HILL visited the NHOU groundwater treatment facility. In the absence of LADWP operation personnel, only a cursory visual inspection of the facility was conducted. At the time of the visit, the treatment system was online. The chlorine storage area was locked and inaccessible. There was no sign posted on the fence immediately surrounding the facility. Photographs of the facility were taken during the site visit and are presented in Appendix A (Photographic

Record). A list of questions about the treatment facility was prepared, and LADWP was asked those questions during a conference call on April 15, 1998.

Based on the conference call, the treatment facility was treating groundwater from six wells at the time of the April 13 visit. Extraction Well No. 2 was not operational because its pump was being repaired. According to LADWP, an operator visits the treatment facility daily to inspect it, collect operating data, and perform repair and maintenance, as needed. All relevant operating documentation is kept onsite, inside the locked chlorine storage area. The documentation includes a copy of the SCAQMD permit, the DHS permit, operations logs, Material Safety Data Sheets for chlorine and sodium hexametaphosphate, the Los Angeles City Fire Department Facility Information Document, and the RMPP for handling chlorine. A copy of the facility's Operation and Maintenance Manual is kept at the nearby filtration plant 15 minutes away from the facility.

According to LADWP, there is a Hazardous Materials sign posted on the entrance gate to the LADWP storage yard. The new facility signs are currently being installed at all of the Department's water treatment facilities. These signs will cover the facility name and the type of treatment used, and will indicate if chlorine or other hazardous materials are stored at the site. The facility is currently operated below the design capacity (2,000 gpm). The current maximum groundwater flow to the aeration tower is reported at 1,700 gpm.

5.0 Conclusions/Recommendations

The NHOU Remedy is effective in achieving the objectives specified in the ROD. The NHOU TCE plume shrank rapidly in size between 1992 and 1994, corresponding with a downward trend of TCE concentrations from below 200 µg/L in 1992 to below 100 µg/L in 1994. The plume appears to have stabilized between 1995 and 1996. In 1996 and 1997, an upward trend in TCE concentrations was observed in one extraction well, suggesting the arrival of a contaminant pulse that may have resulted from ongoing contaminant transport, changes in groundwater flow conditions, or an increase in hydraulic control associated with the recent consistent operation of the NHOU groundwater treatment plant. There was no significant change in the NHOU PCE plume during this same period. The plume appears to have stabilized between 1993 and 1996.

Groundwater modeling simulations (CH2M HILL, 1996) indicate that the operation of NHOU wells, in conjunction with other LADWP's eastern North Hollywood wells, control the NHOU plume area, even at minimum extraction rates. Simulations of past pumping conditions estimate an area of hydraulic control by the end of WY 1994 of about 220 acres. Simulations of expected future NHOU extraction rates indicate that the NHOU Remedy may achieve hydraulic control over 900 acres during WYs 1995 through 2010, reaching a total of more than 1,100 acres between the time it began operating in 1989 and WY 2010. This represents an increase of almost five times the controlled plume area and three times the plume mass, compared to the 1994 WY simulation.

Simulations also indicate that without concurrent extractions by LADWP's eastern North Hollywood wells, a narrow hydraulically uncontrolled path may remain open through the NHOU area between extraction wells NHE-6 and NHE-7. To refine and verify modeling results, CH2M HILL recommends additional model simulations using more accurate water-level data obtained from digital groundwater-level recorders recently installed in most of the RI monitoring wells.

Since it began operation in 1989, the NHOU groundwater treatment facility has met all requirements stipulated in the DHS and SCAQMD permits and has achieved the treated water quality specified in the ROD. The facility was operated intermittently from 1989 to 1995 due to various maintenance and repair activities. In 1996 and 1997, the facility's percentage of uptime improved significantly. Most recently, in January and February of 1998, the facility was online continuously. Should the facility's operation become intermittent again in the future, an engineering review will be performed to evaluate options to achieve and maintain the best achievable uptime. In the meantime, as recommended by CH2M HILL, LADWP is posting the facility sign at a place where it can be more visible.

6.0 References

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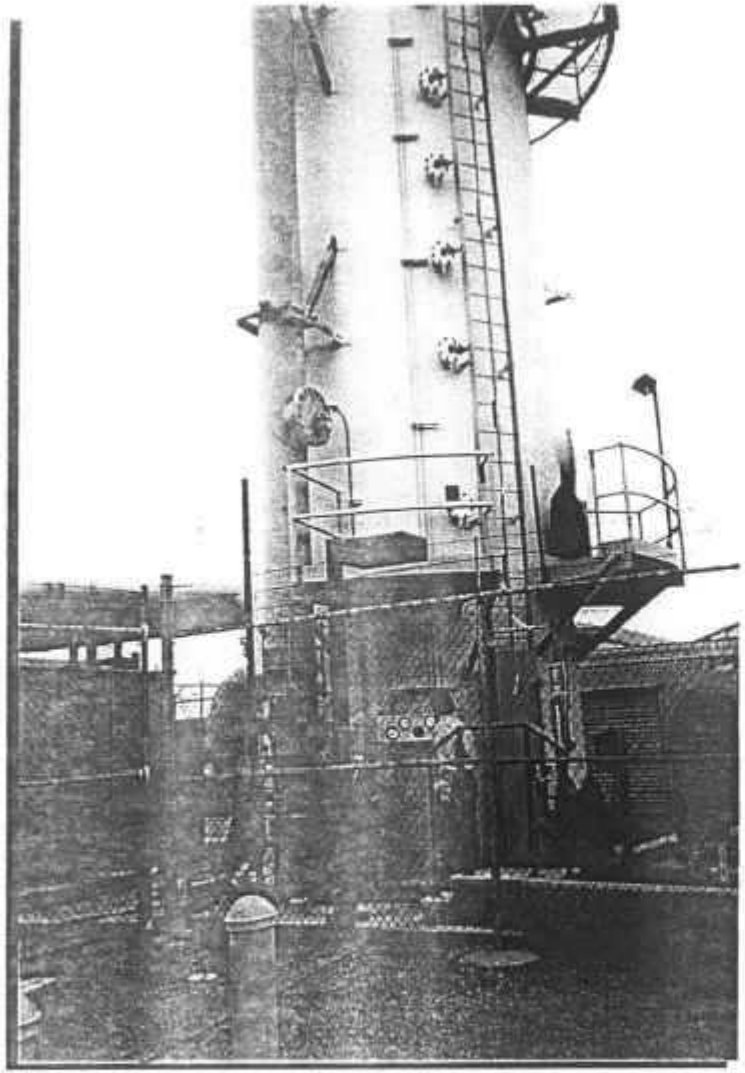
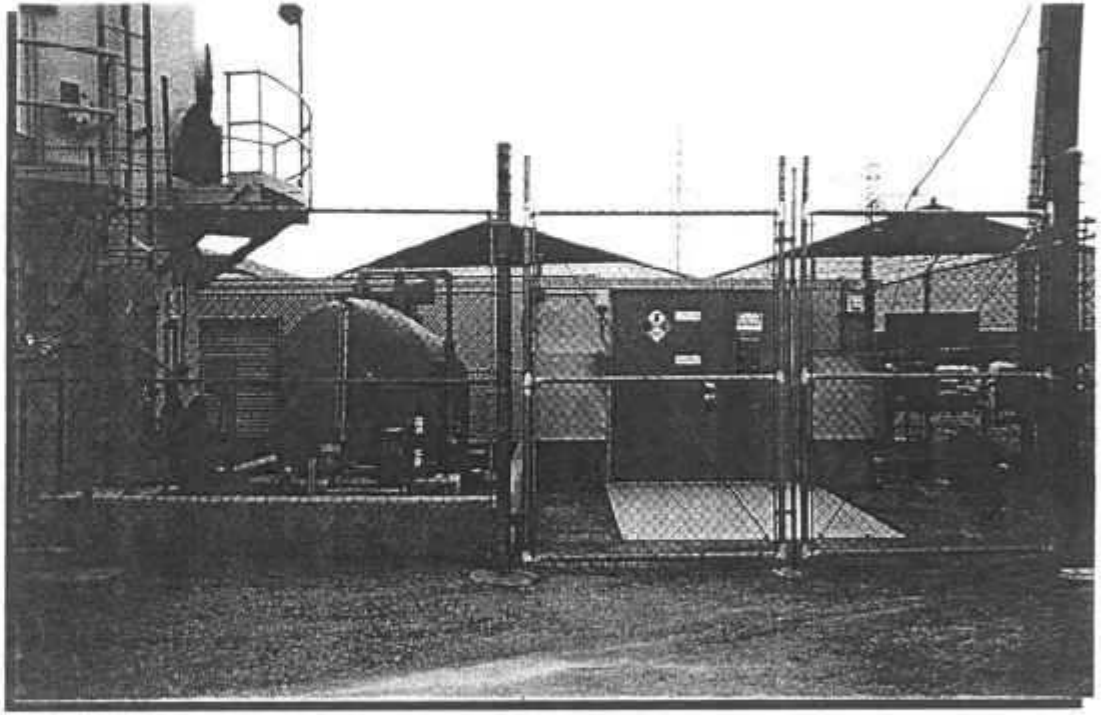
Appendix A

Photographic Record





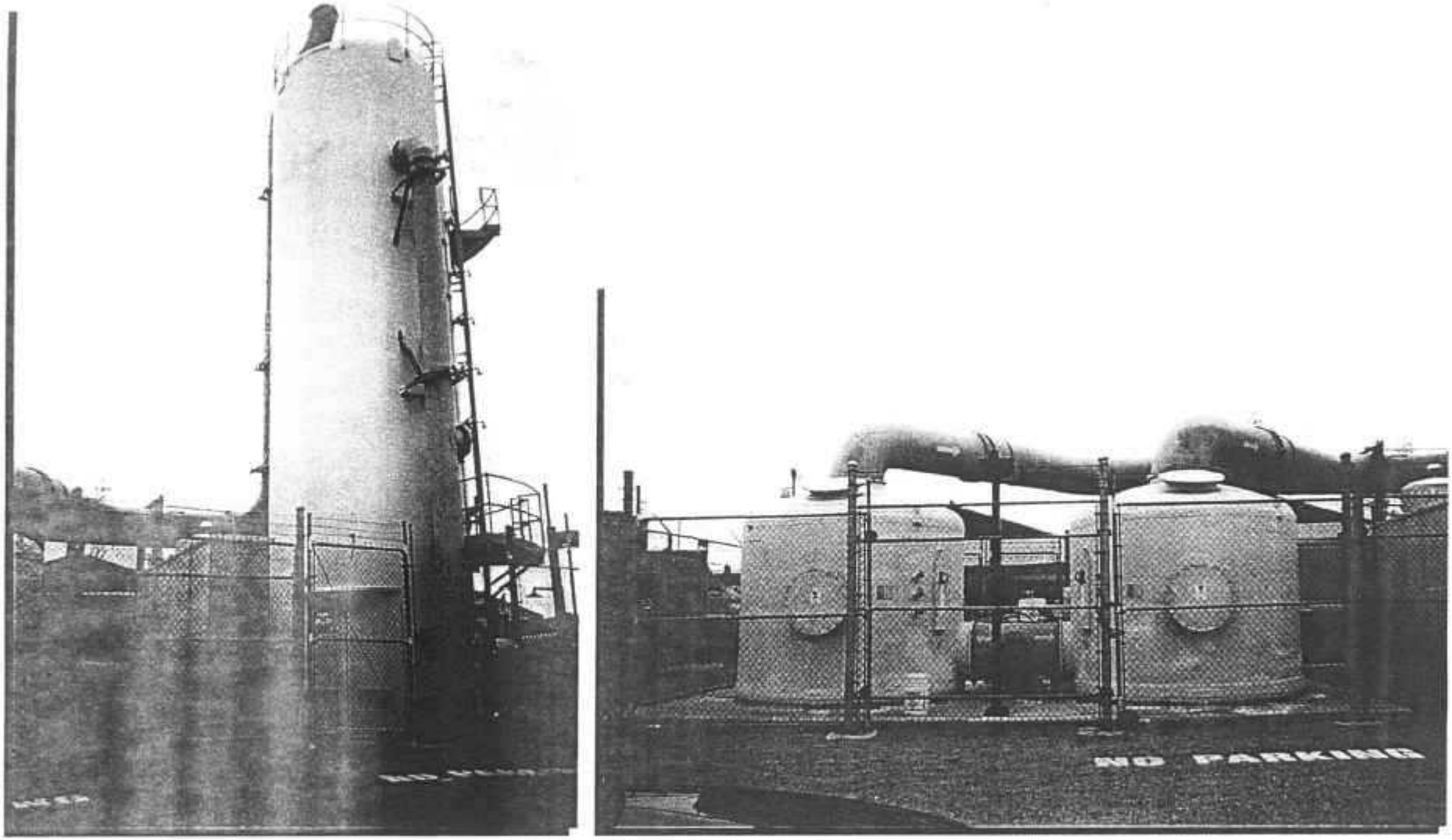
Photographic Record

North Hollywood Operable Unit Groundwater Treatment Facility

Date: April 13, 1998

Photographer: Christina Hong

Description: Aeration Tower, Sodium Hexametaphosphate Storage Tank, and Chlorine Storage Building



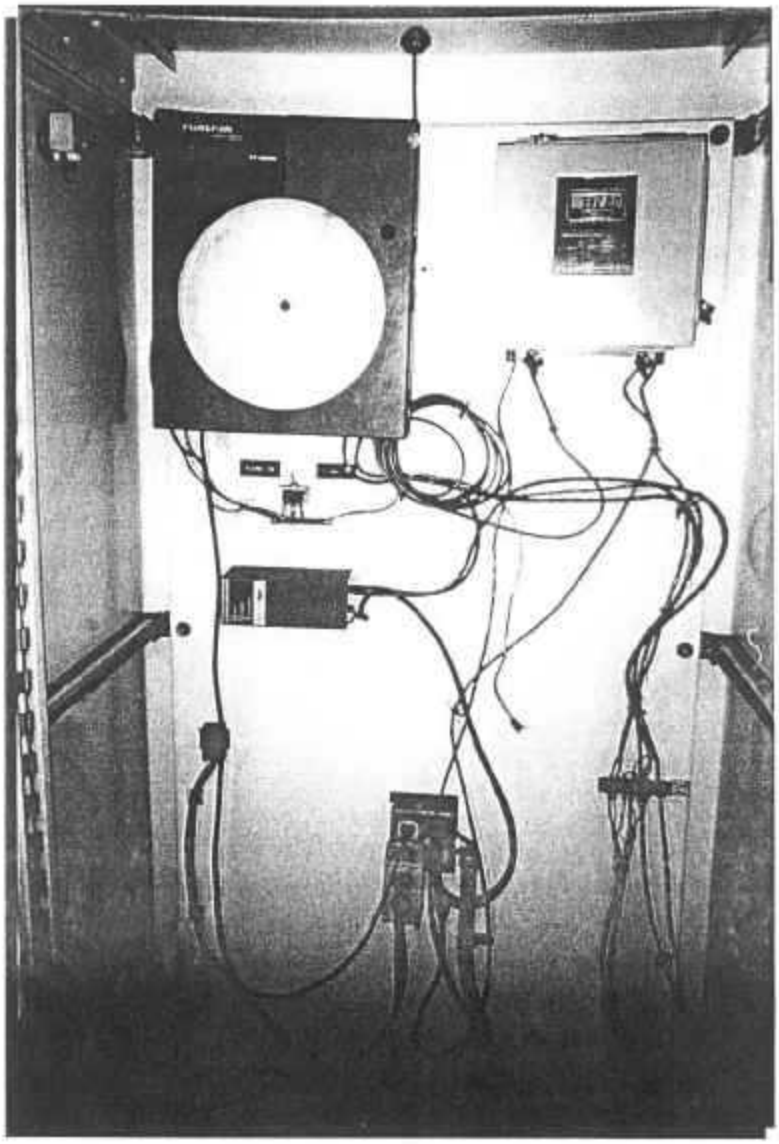
Photographic Record

North Hollywood Operable Unit Groundwater Treatment Facility

Date: April 13, 1998

Photographer: Christina Hong

Description: Carbon Filters and Aeration Tower



Photographic Record
North Hollywood Operable Unit Groundwater Treatment Facility
Date: April 13, 1998
Photographer: Christina Hong
Description: Aeration Tower Flow Recorder